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AMSAT's Newsletter for the Amateur Space Program.

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Booster Flaw Delays Ham-In-Space

The National Aeronautics and Space Administration (NASA) last week announced its decision to delay the STS-9 flight of space shuttle Columbia. The announcement came on the heels of revelations that disaster was barely averted in STS-8 which flew in September. Dr. Owen Garriott, W5LFL, is manifested aboard STS-9.

NASA said defective insulation material on the solid fuel booster nozzles had very nearly burnt through on STS-8. According to the authoritive journal *Aviation Week and Space Technology*, STS-8 came within a few seconds of cataclysm because the nozzle ablative material burnt through to within a fraction of an inch of the nozzle itself, a combination of steel and aluminum alloys. The nozzle would have burnt through in about six seconds officials stated. Had that happened, the thrust vector would have been severely offset making control, even under computer assist, virtually impossible. Experts thought recovery from the resultant attitude unlikely.

Tests of ablative material from the same lot used on the STS-8 boosters showed the problem was general. Apparently the ablative material on the STS-9 boosters are also suspect. An ablative is a substance (such as aluminum silicate) which is designed to protect vital spacecraft components by absorbing and dissipating heat by phase change from solid to liquid and from liquid to vapor. The suspect ablative failed to provide the required protection margins.

With the delay of STS-9, the ham-in-space mission of Dr. Owen Garriott is delayed as well. Garriott was to operate a two-meter FM transceiver from Columbia during several orbits during the scheduled 178 orbit flight. Hams around the world have been alerted and thousands are preparing for the opportunity to try to work the first amateur radio space station. Now those plans will have to go on hold.

Rescheduling STS-9 may prove a major headache. NASA wants to turn the mission around and launch 28 November. ESA wants to wait until Feb. or March. Program officials believe repairs to the boosters can be done and the shuttle restacked for launch by then. But there's a serious hitch. The European Space Agency (ESA) has a major scientific package aboard. Its Spacelab houses millions of dollars in scientific packages not to mention the years invested in preparing them. Spacelab's experiments critically depend on precise timing of the launch. Especially critical is the phase of the moon. Many of the experiments depend on low light levels for optimum sensitivity. That means no moon in sight. Moreover, the earth's albedo (reflectivity) increases markedly with snow-cover and winter-associated fogs; another negative for a November launch. ESA is pressing for a slip to February when favorable light conditions will next occur.

Making rescheduling yet more difficult is the imperative of having proper lighting conditions at potential emergency recovery sites such as Zaragosa, Spain. That means sunlight since this site has inadequate artificial runway lighting.

All this makes for a planner's nightmare. NASA urgently needs to get on schedule as soon as possible to avoid further schedule slips. Important paying customers and national security payloads cannot wait. NASA wants to go at the first possible moment. ESA, on the other hand, has its most ambitious science complex at stake. According to a Lockheed scientist quoted in *Science News*, "If the shuttle is launched in November, 50 percent of our experiments would be eliminated and the other half would suffer greatly." The scientist is principal investigator in an experiment to study polar auroras with light sensitive instruments.

On a grander scale yet, the rescheduling dilemma may exacerbate the keen, evolving competition between NASA and ESA for paying launch customers. By pressing for a launch delay until favorable lighting conditions which next occur in February, 1984, ESA may be attempting to concurrently strengthen its own hand. Its Ariane L7 mission last week scores a major victory with the successful launch of a large Intelsat F7 communications satellite to a geosynchronous transfer ellipse. The prior launch, L6, carried AMSAT-OSCAR 10 and ECS-1 to orbit last June 16. With two consecutive successful launches, Ariane is fast becoming viable shuttle competition; a fact certainly not lost to the NASA managers. Thus the apparent desire in Washington to get STS-9 off the pad as soon as possible, science and ESA notwithstanding.

Amateur radio operations on STS-9, although a focus of broad interest in the ham world, ride on the fortunes of decisions of managers concerned mainly with issues far

greater than those of the ham world. Yet to the youngster whose imagination has been spurred by the chance to reach out and be part of the grand space romance, it is a bitter pill to realize that his long-awaited, once-in-a-lifetime shot is in jeopardy. However, this apparent set-back should be tempered by the realization that W5LFL likely will just be the first of many hams-in-space. NASA and ARRL officials and Dr. Garriott himself has told *ASR* that if things go well for W5LFL, his footsteps may be followed soon by several others in a succession of opportunities for the general public (hams) to join in with space activities by talking directly with astronauts in orbit.

Meanwhile, ARRL and AMSAT plans to support STS-9 have been put on temporary hold pending determination of the new launch date. *ASR* #65 (this edition) had been planned as a special STS-9 issue. We'll run it about 2 to 3 weeks ahead of the launch when it's scheduled. November *QST* features many aspects of the STS-9, Ham-in-Space story including a cover photo. It too may need to be recycled upon rescheduling of STS-9.

Short Bursts

• VE3EFX reports a very successful AMSAT forum at the Radio Society of Ontario Convention held in Toronto 24 Sept. 83. Well over 100 attended. Bill presented a review of OSCARs from 1 through AO-10 and also touched on future projects such as PACSAT. The audio recordings of UoSAT's Digitalker were well-received, Bill reports. He also notes that a substantial upturn in Ontario AMSAT membership is anticipated as a result of the successful forum. Nice work, Bill!

• Another Bill, KØRZ, reports that Mode L operation has been difficult but definitely possible. His 2.5 kW ERP signal is just barely above his receive noise on the downlink. Stations heard include F9FT, DJ5BV, VE7BBG, K6MYC, W8YIO, DJ3OS, DJ8QL.

• K6MYC has led a DXpedition to CEØ. Mike was heard several times on AO-10 at about 145.95 ssb with an excellent signal from Easter Island. He's signing K6MYC/CEØ. New DX on AO-10 also includes YV5ZZ, Ed, and TI2NA, Eric. Arturo, LU2AHC is now on from Buenos Aires. Welcome all!

• AMSAT net times will be adjusted for the change to Standard time this coming weekend. Sunday International Nets (15 and 20 meter sessions) will maintain the current UTC time of 1800 and 1900 UTC, respectively. They will thus be heard one hour earlier local time in North America. The regional nets will maintain LOCAL time, however. That is, the 75 meter nets will continue to be aired beginning with the East Coast session at 2100 EST Tuesday evening. This will be one hour later, 0200 UTC Wednesday. Confused? Me too...and I had to write this!

• New member processing and receipt of your first magazine typically takes between 4 to 6 weeks. Please be patient.

• The leader in the Member Recruitment Contest now has more than 30 points with others hot on his heels. Scores on contestants vying for the prizes have brought in close to 200 new members so far. And the action is just heating up! How many do you have? Will you win a new GaAsFET preamp or a new elevation rotor? How about a 70 cm crossed yagi antenna for AO-10 complete with polarization switches?! Just be among the top ten contestants and one of these prizes might be yours. See some of them, including the first prize, the fabulous new FT-726R at the Amateur Radio Satellite Space Symposium this 12 Nov.

• Congratulations to the AMSAT team at the ARRL National Convention for the great effort they put in. The really hustling team brought in close to $1300 for the cause and did AMSAT proud in the process. Under the skilled hand of KO5I, the AMSAT events came off like clockwork. Ably assisting Doug were K8OCL, N5AHD, NK6K, KS5H. See related photo.

• The Radio Society of Great Britain (RSGB) has joined ARRL in providing bulletins via AO-10. The RSGB voice bulletin service airs Sundays at 1430 and 1830 UTC on Special Service Channel H1, 145.972 MHz. They'll be operating RSGB special call, GB2RS.

• Congratulations to new Assistant Area Coordinators Larry Koziel, K8MU (Michigan) and Tim Kearney, NZ4Q (Georgia). Welcome and thanks!

• The next Teleconference Radio Net will feature a series of mini-tutorials by AMSAT experts. The TRN begins at 7:30 CST and will be relayed by perhaps a hundred repeaters across North America. Unfortunately AO-10 will be out of range during the event but plans are being made to record the TRN for later retransmission on AO-10. Don't miss this one! Details to follow.

• Harold Winard, KB2M, *Orbit* Magazine's new Editor, is looking to help you get your ideas together for possibly publishing an article in *Orbit*. Reach Harold at home at 201-361-6478 or write P.O. Box 575, Wharton, NJ 07885. WA2LQQ will continue as technical advisor to *Orbit* through the transition period and further as required.

• Because of the eclipses of AO-10 (reaching 40 minutes per orbit at this writing) the operating time on Mode B has been reduced nominally. The new operating time calls for Mode B from Mean Anomaly 1 (perigee) through 220. Previously it had been 1-235 but studies showed this caused too much draw-down on battery reserves. Thus the need to cut back by about 41 minutes per orbit. ((235-220)/256)*699.52 min/orbit.

The AMSAT Booth at the ARRL National Convention. Shown are (l. to r.) N5BXP, N5AHD and K8OCL.

Space Symposium, Annual Meeting

Co-planner W3TMZ has provided *ASR* with details of the Amateur Radio Satellite Space Symposium and AMSAT Annual General Meeting. Both events will be held at the Kossiakoff Center of the Applied Physics Laboratory (APL), Johns Hopkins University near Columbia, Maryland 12 Nov. A detailed access map is shown.

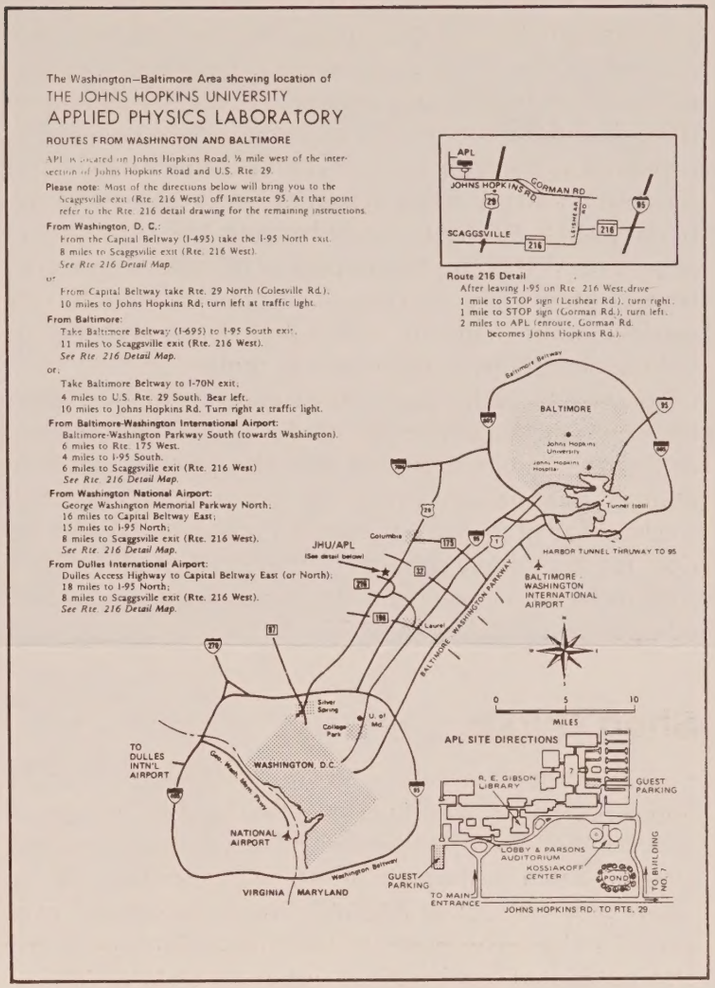
Agenda

0815	Registration desk opens
0900-0925	Introduction to APL; welcoming remarks (tentatively by the APL Director)
0925-0930	Introduction of the APL Amateur Radio Club
0930-0945	Introduction to AMSAT, Chairman of the Board W6SP
0945-1200	Morning Program Section
1200-1315	Catered Luncheon on premises; $7.50*
1315-1730	Afternoon Program Section
1730-1830	Attitude adjustment hour (Social hour; cash bar)
1830-1930	Catered Dinner on premises; $15.00*
1930-2200	AMSAT Annual General Meeting

*Reservations for either or both luncheon and dinner *must* be made in advance not later than 7 Nov. 83. Contact AMSAT HQ, 301-589-6062.

The exact timing of each separate event in the morning and afternoon programs were unavailable at press time, however, W3TMZ did provide a list of the planned events as follows:

OSCAR 10 — Design, construction and capabilities
OSCAR 10 — Ground station and operating standards
OSCAR 10 — Mode L operations, status
Spacecraft Technology — W3GEY on advanced topics
Panel Discussion — PACSAT, UoSAT-B, packets on AO-10
Computer Topics — Tracking programs, displays, controls
Solar Sail — What it's all about



STS-9 — Latest on the Ham-In-Space, ala W5LFL
AST — The Amateur Space Telescope project
Future Projects — Discussion of where amateurs are heading in space activities

Some sessions will run concurrently. Real-time, live demonstrations of AO-10 communications, packet radio transmissions and various tracking programs/displays will take place throughout the day. W3XO is co-planner of the day's events with W3TMZ.

K8OCL accepts a check for $10,000 from the ARRL Foundation presented by W1QV as KO5I looks on.

ARRL Foundation Donates $10K

In the latest in a welcomed series of support moves, the ARRL Foundation has again expressed its support powerfully and tangibly. Represented by its Chairman W1QV, Robert York Chapman (Chappie), the ARRL Foundation presented a check for $10,000 to AMSAT Senior Vice President K8OCL, John Champa. The presentation took place at the ARRL National Convention in Houston earlier this month. (See photo.) AMSAT expresses its sincere and enthusiastic gratitude for the confidence, encouragement and commendation symbolized in this donation. The ARRL Foundation has donated $30,000 this year!

From KA9Q

AO-10 Apogee Times
Sat Oct 29 05:39:27.276 1983 UTC at 14.599N 215.624W
Sat Oct 29 17:18:58.385 1983 UTC at 14.648N 30.934W
Anom period: 699.524872 minutes
Long. Increment 184.690 deg east/orbit; 9.39 deg east/2 orbits

oscar-9:
Wed Oct 26 00:50:09.155 1983 UTC: Ascending node at 140.5 west
Nodal period: 94.57957 min
Longitude increment: 23.643348 deg w/orbit
Element set 523, epoch: Fri Oct 14 01:55:46.817 1983 UTC

oscar-8:
Wed Oct 26 00:32:36.369 1983 UTC: Ascending node at 96.5 west
Nodal period: 103.16595 min
Longitude increment: 25.793761 deg w/orbit
Element set 805, epoch: Tue Oct 11 20:05:45.389 1983 UTC

rs-5:
Wed Oct 26 00:00:45.349 1983 UTC: Ascending node at 123.0 west
Nodal period: 119.55356 min
Longitude increment: 30.015432 deg w/orbit
Element set 123, epoch: Mon Oct 10 03:26:01.829 1983 UTC

rs-6:
Wed Oct 26 00:48:18.788 1983 UTC: Ascending node at 141.0 west
Nodal period: 118.71663 min
Longitude increment: 29.806034 deg w/orbit
Element set 65, epoch: Sat Oct 8 01:28:03.983 1983 UTC

rs-7:
Wed Oct 26 00:51:56.568 1983 UTC: Ascending node at 138.5 west
Nodal period: 119.19520 min
Longitude increment: 29.925760 deg w/orbit
Element set 124, epoch: Sat Oct 1 00:54:59.122 1983 UTC

rs-8:
Wed Oct 26 00:34:34.121 1983 UTC: Ascending node at 130.0 west
Nodal period: 119.76323 min
Longitude increment: 30.067889 deg w/orbit
Element set 247, epoch: Thu Oct 13 01:11:30.778 1983 UTC

rs-3:
Wed Oct 26 01:22:22.295 1983 UTC: Ascending node at 151.0 west
Nodal period: 118.51895 min
Longitude increment: 29.756600 deg w/orbit
Element set 80, epoch: Sun Oct 9 10:21:30.729 1983 UTC

rs-4:
Wed Oct 26 00:05:57.340 1983 UTC: Ascending node at 125.3 west
Nodal period: 119.39385 min
Longitude increment: 29.975401 deg w/orbit
Element set 145, epoch: Mon Oct 10 04:01:44.950 1983 UTC

Satellite: oscar-10
Catalog number: 14129
Epoch time: 83285.50000000
Wed Oct 12 12:00:00.000 1983 UTC
Element set: MH 10-11-83
Inclination: 26.0050 deg
RA of node: 236.6270 deg
Eccentricity: 0.6049226
Arg of perigee: 210.5700 deg
Mean anomaly: 17.2220 deg
Mean motion: 2.05854010 rev/day
Decay rate: 0 rev/day^2
Epoch rev: 249
Semi major axis: 26105.707 km
Anom period: 699.524872 min
Apogee: 35520.558 km
Perigee: 3936.693 km
Translate freq: 581.0047 mhz
Invert: 1
Beacon: 145.8100 mhz

Satellite: oscar-9
Catalog number: 12888
Epoch time: 83287.08040297
Fri Oct 14 01:55:46.817 1983 UTC
Element set: 523
Inclination: 97.5569 deg
RA of node: 253.8344 deg
Eccentricity: 0.0001137
Arg of perigee: 236.6515 deg
Mean anomaly: 123.4644 deg
Mean motion: 15.23344898 rev/day
Decay rate: 6.486e-05 rev/day^2
Epoch rev: 11189
Semi major axis: 6870.864 km
Anom period: 94.528823 min
Apogee: 508.165 km
Perigee: 506.602 km
Beacon: 145.8250 mhz

Satellite: oscar-8
Catalog number: 10703
Epoch time: 83284.83733089
Tue Oct 11 20:05:45.389 1983 UTC
Element set: 805
Inclination: 98.7580 deg
RA of node: 291.9257 deg
Eccentricity: 0.0008120
Arg of perigee: 7.0984 deg
Mean anomaly: 353.0321 deg
Mean motion: 13.96578109 rev/day
Decay rate: -1.7e-07 rev/day^2
Epoch rev: 28552
Semi major axis: 7280.998 km
Anom period: 103.109163 min
Apogee: 909.084 km
Perigee: 897.260 km
Translate freq: 581.0974 mhz
Invert: 1
Beacon: 435.0965 mhz

Satellite: rs-3
Catalog number: 12997
Epoch time: 83282.43160566
Sun Oct 9 10:21:30.729 1983 UTC
Element set: 80
Inclination: 82.9556 deg
RA of node: 272.6532 deg
Eccentricity: 0.0059122
Arg of perigee: 153.1700 deg
Mean anomaly: 207.2443 deg
Mean motion: 12.15580726 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 8032
Semi major axis: 7987.359 km
Anom period: 118.461898 min
Apogee: 1660.728 km
Perigee: 1566.282 km

Satellite: rs-4
Catalog number: 13000
Epoch time: 83283.16787147
Mon Oct 10 04:01:44.950 1983 UTC
Element set: 145
Inclination: 82.9669 deg
RA of node: 278.6280 deg
Eccentricity: 0.0016879
Arg of perigee: 224.7168 deg
Mean anomaly: 135.2533 deg
Mean motion: 12.06666291 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 7981
Semi major axis: 8026.674 km
Anom period: 119.337054 min
Apogee: 1672.505 km
Perigee: 1645.409 km

Satellite: rs-5
Catalog number: 12999
Epoch time: 83283.14307672
Mon Oct 10 03:26:01.829 1983 UTC
Element set: 123
Inclination: 82.9551 deg
RA of node: 279.6636 deg
Eccentricity: 0.0009189
Arg of perigee: 257.4527 deg
Mean anomaly: 102.5470 deg
Mean motion: 12.05052030 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 7970
Semi major axis: 8033.846 km
Anom period: 119.496915 min
Apogee: 1683.153 km
Perigee: 1668.388 km

Satellite: rs-6
Catalog number: 13002
Epoch time: 83281.06115721
Sat Oct 8 01:28:03.983 1983 UTC
Element set: 65
Inclination: 82.9585 deg
RA of node: 274.8561 deg
Eccentricity: 0.0049822
Arg of perigee: 172.9858 deg
Mean anomaly: 187.1915 deg
Mean motion: 12.13556218 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 8001
Semi major axis: 7996.245 km
Anom period: 118.659521 min
Apogee: 1658.253 km
Perigee: 1578.575 km

Satellite: rs-7
Catalog number: 13001
Epoch time: 83274.03818428
Sat Oct 1 00:54:59.122 1983 UTC
Element set: 124
Inclination: 82.9582 deg
RA of node: 282.0638 deg
Eccentricity: 0.0021349
Arg of perigee: 204.5528 deg
Mean anomaly: 155.4546 deg
Mean motion: 12.08678651 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 7884
Semi major axis: 8017.757 km
Anom period: 119.138366 min
Apogee: 1660.366 km
Perigee: 1626.132 km

Satellite: rs-8
Catalog number: 12998
Epoch time: 83286.04966178
Thu Oct 13 01:11:30.778 1983 UTC
Element set: 247
Inclination: 82.9552 deg
RA of node: 279.4784 deg
Eccentricity: 0.0017295
Arg of perigee: 301.8725 deg
Mean anomaly: 58.0684 deg
Mean motion: 12.02940035 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 7991
Semi major axis: 8043.253 km
Anom period: 119.706715 min
Apogee: 1694.209 km
Perigee: 1666.388 km

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